

REMARKS

Status of the Claims

Claims 1-14 and 22 are pending in this application, with claim 1 being the sole independent claim. Claim 22 is sought to be added.

Support for New Claim

Support for new claim 22 can be found throughout the specification, for example, at page 24, lines 6-11. No new matter is introduced into the application by the addition of claim 22.

Claim Rejections Under 35 U.S.C. § 103

A. Handberg in view of Carrozza

Claims 1-5, 7-8 and 12-14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Handberg *et al.*, *Avian Pathology* 30:243-249 (June, 2001) ("Handberg"), in view of Carrozza *et al.*, *Avian Diseases* 17:767-781 (1973) ("Carrozza"). (Office Action, page 3). Applicants respectfully traverse this rejection.

As noted in Applicants' previous response, the currently presented claims are directed to methods for detecting a virus in an avian tissue sample. The claimed methods comprise extracting genetic material from an avian tissue sample and testing the extracted genetic material to detect any genetic material from the virus. The claims further specify that the avian tissue sample is derived from one or more feathers of the axillary tract.

Prior to the present invention, a person of ordinary skill in the art would have had no motivation to use axillary tract feathers as the source of genetic material for viral detection in avian tissue samples. In all published reports (of which Applicants are aware) which relate to the extraction and detection of viral genetic material from avian feathers, the feather source is either unspecified or is specified as being from the wing. For example:

- Davidson and Borenshtain, *Avian Pathol.* 31:237-240 (2002)*, mention the extraction and PCR-based detection of Marek's disease virus (MDV) genetic material from the wing

* Cited on Form PTO-892, attached to the Office Action dated October 2, 2007.

feathers of chickens. (See page 238, left column, last sentence under Materials and Methods – Chickens);

- Davidson et al., J. Virol. Methods 13:231-244 (1986) (Exhibit A, attached), refer to the extraction and detection of MDV genetic material from chicken feathers using a DNA dot-blot technique. Again, the only type of feather specified in this article is wing feathers. (See page 233, 8th line from top).
- Handberg et al., Avian Pathology 30:243-249 (2001)*, also refer to a PCR-based assay for the detection of MDV in DNA extracted from the feather tips of chickens. (See page 244, right column under DNA purification). Although the type of feathers used in the assay of Handberg et al. is not explicitly mentioned, the introduction of this paper (see page 243, right column) refers to Davidson et al. (1986), wherein the use of wing feathers is specifically indicated. Thus, the overwhelming implication is that wing feathers were also used in the Handberg et al. assay.
- Zavala et al., Avian Diseases 46:971-978 (2002) (Exhibit B, attached), describe the extraction and PCR-based detection of avian leukosis virus subgroup J (ALV-J) proviral DNA from feather pulp. As with detection of MDV, the feathers used in this genetic assay for ALV-J detection were wing feathers. (See page 973, left column under Sample Collection).

Thus, prior to the present invention, the only type of feather mentioned in the art relating to the extraction and detection of viral genetic material was wing feathers. Nowhere is it mentioned or even suggested that there was a need in the art for an alternative to wing feathers. Wing feathers would have been the preferred tissue sample in part because feathers tend to develop earlier on the wings than on other parts of a bird such as the axillary tract.

The only reference cited against the present claims which mentions axillary tract feathers is Carrozza. Importantly, Carrozza does not refer to the extraction and/or detection of *genetic* material. Instead, Carrozza focuses exclusively on *antigen* (i.e., protein) detection using a fluorescent antibody. A skilled person who, at the time of the present invention, was interested in developing a method for detecting viral genetic material in an avian tissue sample would not have looked to a reference such as Carrozza that relates exclusively to non-genetic antigen detection.

Moreover, a skilled person would have been *discouraged* from using axillary tract feathers in view of Carrozza. In particular, the method taught in Carrozza for obtaining axillary tract feathers for viral detection requires an inconvenient surgical process. To obtain axillary tract feathers for viral detection, Carrozza teaches that the skin surrounding the feather follicles is surgically removed. (See page 770, lines 1-4). This method not only requires the anesthetization of the animals prior to sampling, but also requires suturing the skin at the site of excision after sampling. As noted in Carrozza:

A small piece of skin, containing at least 3 feather follicles, was *excised* from the axillary feather tracts of 3 *anesthetized* chickens from each group for 26 consecutive days. Biopsies were taken from individual birds at about 6-day intervals. Skin at the site of excision was *sutured* and healed rapidly. Half of the each biopsy specimen was homogenized in a Ten Broeck grinder and extracted for soluble antigen.

(See Carrozza page 770, lines 1-8, emphases added).

By contrast, there is no indication in the prior art that sampling wing feathers requires anesthesia, surgical removal of skin, or suturing. Thus, in the context of assaying for genetic material, it is hard to imagine any reason why a person of ordinary skill in the art would have been motivated to substitute the convenient and apparently efficient method of wing feather sampling taught by Handberg, Davidson and Zavala, for the cumbersome and possibly inhumane method of axillary tract feather sampling taught by Carrozza.

The currently claimed invention is an unobvious advance over the prior art in at least two respects. First, unlike the method of Carrozza, the present inventors disclose that axillary tract feathers can simply be "plucked" from live (unanesthetized) birds. (See, e.g., page 27, lines 1-2). No surgical processes or anesthesia are needed.

Second, the present specification discloses that viral DNA can be detected with much greater sensitivity in axillary tract feathers as compared to other feather types. In Example 3 of the present application, chickens were first inoculated with a MDV vaccine strain. Feather samples from various regions of the chickens were then taken and analyzed by real-time quantitative PCR to quantify the amount of viral material in the respective feathers. At 13 days post-inoculation, the MDV copy number in axillary tract feathers was markedly greater than that

observed in other feather types. (See Specification, page 36, lines 13-20). These results are represented graphically in Fig. 10(b). As noted in the specification:

Surprisingly, we have found that virus can be detected in axillary tract feathers at higher levels than in other feathers and therefore *virus can be detected in axillary tract feathers according to the invention when it cannot be detected in other tissue samples, including other feathers.* Accordingly, the methods of the invention are particularly suitable for monitoring the extent to which a flock of birds has been immunised effectively with MDV vaccine, by detecting the presence of the vaccine strain in axillary tract feather tissue samples.

(See Specification, page 3, line 28, through page 4, line 5, emphasis added). These unexpected advantages of axillary tract feathers are neither taught nor suggested in the prior art.

In summary, a person of ordinary skill in the art, without having the benefit of the teachings of the present specification, would have had no motivation to use axillary tract feathers in the method of Handberg. In fact, since wing feathers had been previously shown to be a satisfactory source of genetic material for viral detection, and since the only reference relating to axillary tract sampling (*i.e.*, Carrozza) teaches a complicated surgical process for obtaining these feathers, a skilled person would have been *discouraged* from using axillary tract feathers to detect viral genetic material. It must be concluded, therefore, that it would not have been obvious nor desirable to combine the axillary tract feather sampling method of Carrozza with the viral detection method of Handberg.

Applicants respectfully request that this rejection be reconsidered and withdrawn.

B. Handberg in view of Carrozza and Becker

Claim 6 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Handberg in view of Carrozza, as applied to claims 1-5, 7-8 and 12-14, and further in view of Becker *et al.* *Virus Genes* 7:277-287 (1993) ("Becker"). (Office Action, page 5). Applicants respectfully traverse this rejection.

This rejection depends on the combination of Handberg and Carrozza. As explained in detail above, the combination of Handberg and Carrozza would not have been obvious. Thus, claim 6 is non-obvious for at least the same reasons that claims 1-5, 7-8 and 12-14 are non-obvious.

C. Handberg in view of Carrozza and Burgess

Claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Handberg in view of Carrozza, as applied to claims 1-5, 7-8 and 12-14, and further in view of Burgess *et al. J. Virol. Methods* 82:27-37 (1999) ("Burgess"). (Office Action, page 6). Applicants respectfully traverse this rejection.

This rejection depends on the combination of Handberg and Carrozza. As explained in detail above, the combination of Handberg and Carrozza would not have been obvious. Thus, claim 11 is non-obvious for at least the same reasons that claims 1-5, 7-8 and 12-14 are non-obvious.

Conclusion

Applicants believe that a full and complete response has been made to the outstanding Office Action. In view of the foregoing amendments and remarks, Applicants believe that this application is in condition for allowance, and prompt, favorable action thereon is earnestly solicited. If the Examiner believes that any points require additional consideration, the Examiner is invited to contact the undersigned at the telephone number provided below.

Respectfully submitted,



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